L-245

Guide for controlling

INSECTS AND DISEASES

on Fruits and Nuts in Texas

1955-56

TEXAS AGRICULTURAL EXTENSION SERVICE
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Guide for Controlling Insects and Diseases on Fruits and Nuts in Texas - 1955

Insect and disease control is important in the production of fruit and nuts. Health and vigor of trees and quality of fruit depend on a well-planned and well-executed control program. Losses due to insects and diseases can be reduced by carrying through a spray program and diligently following good orchard sanitation practices.

When and How to Spray

Proper timing of spray applications and thorough coverage of fruits and foliage are essential for best results. Follow the schedules given in the Table to maintain proper coverage. Delays of longer duration than the intervals given result in lack of protection of the fruit at times. Insects and diseases may become established and do extensive damage during these unprotected periods.

Thorough coverage is necessary. Use enough spray to cover the trees thoroughly. Adequate equipment to maintain at least 300 pounds pressure is recommended.

SUGGESTED QUANTITIES OF SPRAY MIXTURE FOR ONE TREE

Age	Plum or Peach	Apple or Pear
Under three years	½ to 1 gallon	———
3 to 4 years	1 to 2 gallons	½ to 1 gallon
4 to 5 years	1 to 2 gallons	1 to 2 gallons
5 to 6 years	2 to 3 gallons	2 to 3 gallons
6 to 10 years	2 to 3 gallons	4 to 10 gallons
10 years and older	2 to 3 gallons	10 to 20 gallons

Pecan Trees: Sufficient spray should be applied to obtain coverage of leaves and small buds in axils of leaves. Trees 50 to 75 feet tall require 60 to 80 gallons of spray.

Spraying Equipment

Effective control of insects and diseases depends on good spraying equipment. Uniform coverage with the least expenditure of power, labor and material is necessary. The sprayer should have sufficient capacity to do the job in a thorough manner. Sprayers should be built strongly to withstand wear and chemical action of the spray mixtures.

Sprayers with an output of 15 to 18 gallons of liquid per minute at a pressure of 300 to 400 pounds per square inch, equipped with a 300-gallon tank, are recommended for peach trees and others of similar size. For pecans and other tall trees, an output of 30 to 35 gallons per minute at 300 to 600 pounds pressure per square inch equipped with a 400 to 600-gallon tank is needed.

Where only a few trees are to be sprayed, smaller power or hand sprayers can be used.

Precautions on the Use of Insecticides and Fungicides

Many new materials for controlling pests are marketed each year. It is important that correct materials be selected for the most effective, safe and economical control. Observe the manufacturers' directions for handling insecticides and fungicides. All materials recommended are safe, if handled in the prescribed manner.

When in doubt about mixing spray materials, see your county agricultural agent for information on the compatibility of insecticides and fungicides. He can supply a copy of L-134, Compatibility Chart for Insecticides and Fungicides.

Parathion: Not compatible with lime: avoid use with lime-sulfur or Bordeaux-mixture.

Parathion effectively controls many pests attacking fruit and nuts, but it also is highly toxic to humans.

Caution: When handling parathion avoid prolonged contact with the skin or breathing the vapors or drift from spray. Never handle parathion wettable powder or emulsion concentrate with bare hands. Persons handling parathion should wear natural rubber gloves—never synthetic rubber, leather or cloth gloves. Goggles and respirators should be worn.

Symptoms and Antidote: Some symptoms of parathion poisoning are: headache, nausea, cramps, blurred vision, weakness, muscular twitching and diarrhea. When symptoms of poisoning occur, consult a doctor immediately. Atropine is the recommended antidote. Many handlers and users of parathion keep atropine tablets on hand for emergencies. Persons affected with parathion poisoning should not handle the insecticide again without a doctor's advice.

PEACHES AND PLUMS

INSECTS AND DISEASES	WHEN TO SPRAY	INSECTICIDES AND FUNGICIDES Based on 100 gallons of spray	REMARKS
San Jose scale, peach leaf curl	Winter	3½ gal. of a 97% oil emulsion. 6-6-100 Bordeaux-mixture for peach leaf curl.	Apply oil spray during December or January before buds swell in the spring. Leaf curl disease causes curled, thickened and distorted leaves. The fungus overwinters on the bark of twigs and limbs.
Peach twig borer	When buds are pink.	3 lb. 50% wettable DDT powder.	Apply spray to orchards in WEST CROSS TIMBERS and HILL COUNTRY areas only. Peach twig borer passes winter as immature worm hidden in a silken covering, attached to crotches of young branches. Worms burrow into and kill tender growth in the spring. Later generations feed entirely on fruit. There are two or more broods per year.
Plum curculio, catfacing insects, peach twig borer, brown rot	PETAL FALL When 75% of the petals have fallen.	2 lb. lead arsenate + 8 lb. hydrated lime + 4 lb. 36% Monohydrate zinc sulfate + 3 lb. 50% wettable DDT + 6 lb. wettable sulfur, or 1 lb. 25% wettable dieldrin + 6 lb. wettable sulfur, or 2 lb. 15% wettable parathion + 6 lb. wettable sulfur.	PLUM CURCULIO destroys fruit, also provides entry for brown rot. If lead arsenate is used, add hydrated lime and zinc sulfate to reduce injury to foliage. Parathion gives excellent control under orchard conditions and appears effective in reducing scale. CATFACING INSECTS feed on fruit early in the season and cause them to become deformed or catfaced. These insects are especially injurious where legumes are grown in or near orchards. BROWN ROT disease attacks blossoms, reducing yields. Cankers may form on twigs, frequently causing them to die. The disease attacks ripe fruit, causing them to rot quickly. The fungus overwinters in fruit mummies which should be destroyed immediately after harvest.
DO NOT APPLY LEAD ARSENATE, DDT, PARATHION OR DIELDRIN WITHIN 30 DAYS OF HARVEST.			
Same as petal fall, plus scab	SHUCK SPRAY 10 days after petal fall spray.	Same as petal fall.	Same as above. SCAB attacks peach twigs, leaves and fruit. The fungus appears on the fruit as small, round olive-black spots, becoming visible about the time fruit is half-grown. Trees grown in dry sections rarely are affected. Scab occasionally attacks plums but is of little importance.
Same as shuck spray plus oriental fruit moth.	FIRST COVER SPRAY 10 to 14 days after shuck spray.	Same as petal fall.	ORIENTAL FRUIT MOTH usually attacks peaches ripening with Elberta or later. New growth is attacked in early spring; later the generations invade fruit which may appear perfect at harvest but break down soon after packing.
A. Early varieties: brown rot and scab. B. Mid-season and late varieties: same as first cover spray.	SECOND COVER SPRAY 14 to 21 days after first cover spray.	Early varieties: 6 lb. wettable sulfur. Mid-season and late varieties: same as petal fall.	
Same as first cover spray.	THIRD COVER SPRAY 21 to 25 days after second cover spray (30 days before harvest.)	Same as petal fall.	

Same as first cover spray.	THIRD COVER SPRAY 21 to 25 days after second cover spray (30 days before harvest.)	Same as petal fall.

PEACH TREE BORER: The adult lays eggs in the summer on the tree trunk. Eggs hatch in about 10 days. Borers enter the bark and feed on the cambium and inner bark at or below soil level.

CONTROL:

TRUNK SPRAY—Begin treatment July 1 to 15 and make 3 spray applications at 30-day intervals. Spray the trunk with 8 lb. of 50% DDT, or 1 lb. of 25% lindane, or 2 lb. of 25% dieldrin wettable powders in 100 gal. of water. It is important that the first spray be applied not later than July 15.

OR

PARADICHLOROBENZENE CRYSTALS (PDB) — Treat between October 20 and November 15 when the soil is dry and soil temperature is 55° F. or above. Remove weeds and loosen and level soil about one foot from the tree trunk. Place PDB crystals in a narrow, circular band, preferably in a groove about 2″ from the trunk. Place several shovels of clean soil over the crystals and mound the earth into a cone-shaped pile about 6″ high around the base of the tree. In placing the first few shovels of soil, avoid pushing any of the material against the tree, since crystals in contact with the tree cause injury. Compact the soil with the back of the shovel. Remove earth mounds in early spring. For 2 and 3-year-old trees, use ½ oz. of crystals; 4 to 5-year-old trees, ¾ oz; mature trees, 1 oz.

OR

ETHYLENE DICHLORIDE EMULSION — Best results are obtained when the treatment is applied in October or early November. Stock emulsions of this material may be obtained from insecticide dealers. Follow directions on manufacturers' label in diluting and applying the chemical.

LESSER PEACH TREE BORER: Damage occurs above ground in the trunk and limbs of the tree. The borers commonly occur where trees have been injured by implements, low temperature or other means.

CONTROL:

Keep trees in a healthy-growing condition and as free as possible from wounds, cankers and winter injury. Borers can be controlled in the wounds by painting the affected areas with PDB in oil, prepared by dissolving 2 lb. of PDB in 1 gal. of a miscible dormant oil and diluting with 2 gal. of water. Treat only the affected areas and do not circle the entire trunk or limb. Apply during a warm, sunny day after the trees have shed all foliage.

SHOT-HOLE BORER: Borer damage can be recognized by the presence of tiny holes in the bark. These are exit and entrance holes made by the small adult beetle.

CONTROL:

This borer usually attacks dead or weakened trunks and branches. All dead or dying trees and branches should be removed and burned. The vigor of remaining trees should be increased by proper fertilization, drainage and control of other borer and scale insects.

BACTERIAL SPOT: As in the case of fire blight of apple and pear, prune out during winter thick-edged cankers on the twigs and branches in which the bacterial pathogen overwinters. The disease occurs on the leaves, twigs and fruit and is spread by wind-blown rain. Heavy leaf infections cause premature defoliation which leads to serious loss of vigor. A spray of 8 lb. monohydrated zinc sulphate and 8 lb. hydrated lime in 100 gal. of water has been used for the control of bacterial spot, but the results obtained with this treatment have been variable.

PHONY PEACH AND PEACH MOSAIC: Obtain expert opinion as to the actual presence of these virus diseases in your orchard. Contact your county agricultural agent. Remove and burn all diseased trees.

APPLES AND PEARS

INSECTS AND DISEASES	WHEN TO SPRAY	INSECTICIDES AND FUNGICIDES Based on 100 gallons of spray	REMARKS
Scale	Winter	3½ gal. of a 97% oil emulsion.	Oil emulsion spray should be applied while trees are fully dormant.
Aphid and diseases	When first pink shows in center buds.	2 lb. 15% wettable parathion or 5 lb. 6% gamma BHC. For diseases, add 6 lb. wettable sulfur.	APHIDS cause leaves on the terminal growth of the twigs to curl, become deformed and possibly die. Injury to the buds may develop also from heavy aphid infestations.
Diseases	When 20 to 25% of the petals have fallen.	2-6-100 Bordeaux-mixture or 2 lb. ferbam.	
Codling moth, curculio, diseases	When 90% of the petals have fallen.	2 lb. 15% wettable parathion + 6 lb. wettable sulfur or 2 lb. 50% wettable captan or 3 lb. 50% wettable DDT + 2 lb. lead arsenate + 6 lb. wettable sulfur or 2 lb. 50% wettable captan.	Proper timing of spray is very important for control of codling moth and curculio. Codling moth worms do little feeding before entering the fruit. Lead arsenate is added for curculio control.
Same as above.	2 weeks after 90% of the petals have fallen.	Same as above.	If heavy infestations of leaf diseases and fruit blotch appear or if dropped fruits show codling moth infestations, apply two or more sprays at 2-weeks intervals.

(CONTINUED ON NEXT PAGE)

APPLES AND PEARS (Continued)

Mite	When present.	2 lb. 15% Aramite wettable powder or 1 to 2 lb. 15% wettable parathion.	Where DDT is used in the spray for codling moth control, mites may be a serious problem. These pests are not likely to be a problem where parathion is used for control of the codling moth and curculio.

FLATHEADED APPLE TREE BORER: The larvae or grubs attack main trunk or large branches, feeding just under the bark and in the wood, the larger ones going into the wood a distance of an inch or two.
CONTROL:
Borer damage may be prevented by wrapping the trunks of the trees the first year they are set. Wrapping should extend from the ground level to the lower branches. The only effective remedy, once a tree is infested, is to cut out the grubs with a sharp-pointed knife. Promote healthy, vigorous trees.

ROUNDHEADED APPLE TREE BORER: The larvae or grubs feed on the inner bark and sapwood of the tree. Burrows are usually made in the trunk 1 or 2 inches below the surface of the ground to a foot or more above ground.
CONTROL:
Hand-worming in August and September is recommended. Large borers in their burrows may be killed by injecting with an oil can or similar device a solution of either 1 gram of paradichlorobenzene in 1 cc. of carbon disulfide or a 5% rotenone extract in acetone.

SHOT-HOLE BORER: Borer damage can be recognized by the presence of tiny holes in the bark. These are exit and entrance holes made by the small adult beetle.
CONTROL:
This borer usually attacks dead or weakened trunks and branches. All dead or dying trees and branches should be removed and burned. Promote healthy, vigorous trees by proper fertilization, drainage and control of other borer and scale insects.

FIRE BLIGHT: Prune out twigs and limbs during winter. Make all cuts several inches below visible cankers. Sterilize cutting instruments after each cut by dipping in formaldehyde (1 part in 25 parts water). Coat pruning wounds with Bordeaux paint. Heavy pruning and overfertilization of trees cause excessive growth which is very susceptible to fire blight.

ROOT ROT: The roots of orchard trees, particularly apple and pear commonly are attacked by the oak fungus CLITOCYBE sp. Diseased trees usually die soon after visible symptoms are noticeable in the above-ground parts of the trees. An examination of the crown and large roots by carefully separating the bark from the wood reveals fan-shaped growth of white strands — a destinctive characteristic of oak fungus. Control of the disease is difficult because the spores of the fungus which are produced in great numbers by the fruiting bodies (mushrooms), are spread long distances and over large areas by wind. Avoid planting new orchards in recently cleared land. Before planting an orchard in a new site, all stumps and large roots should be removed.

PECANS

INSECTS AND DISEASES	WHEN TO SPRAY	INSECTICIDES AND FUNGICIDES Based on 100 gallons of spray	REMARKS
Scale and phylloxera	Winter	3½ gal. of a 97% oil emulsion.	If dormant sprays are not used, phylloxera may be controlled by spraying with 1 pt. nicotine sulfate + 3 to 4 lb. soap in 50 gal. of water, applied when leaves are ⅓ grown. Phylloxera pass the winter in the egg stage in protected places on branches. The young insects appear in the early spring about the time the buds unfold and galls are produced on leaves and young twigs.
Scab	Prepollination (when leaves are ⅓ grown and before pollen is shed)	2 lb. zineb (Diathane Z-78 or Parzate dry) or 4-2-100 Bordeaux-mixture	Pecan scab fungus overwinters on old shucks, leaves and twig cankers. In the spring scab fungus is carried by wind and rain to young leaves where it causes infection. In these first few scab spots more spores are produced and spread. Trees should be sprayed thoroughly when weather conditions are favorable for spread of the disease. Scab problems are more serious in orchards where air drainage is poor and relative humidity is high. Some pecan varieties are more susceptible to scab than others. Contact your county agricultural agent for information regarding pecan varieties recommended for your area.
Pecan nut casebearer	Soon after pollination or about the time the tips of tiny nuts turn brown.	3 lb. 50% wettable DDT or 2 lb. 15% wettable parathion or 1 pt. 40% nicotine sulfate plus 2 qt. summer oil.	Pecan nut casebearers pass the winter as partly grown larvae in tiny cases, usually at the base of the buds. The larvae feed in the spring in the young tender shoots and emerge as adults or moths about the time the nuts are set. Examine tiny nuts for greenish-white eggs. If present, spray thoroughly. Sprays are ineffective after worms enter nuts.
Scab		Add 2 lb. of zineb (Dithane Z-78 or Parzate dry) or 6-2-100 Bordeaux-mixture for scab control.	1 TO 3 ADDITIONAL SPRAY APPLICATIONS MAY BE NEEDED AT 3 TO 4-WEEK INTERVALS FOR SCAB CONTROL.

Aphid	When present	1 lb. 12% gamma BHC or its equivalent or 1 pt. 40% nicotine sulfate + 3 lb. soap or 2 lb. 15% wettable parathion	APHIDS may be a problem when trees are sprayed with DDT for casebearer or when Bordeaux-mixture is used for scab control. BLACK PECAN APHIDS cause injury by sucking juices from the leaves. Bright yellow spots appear around feeding punctures. These spots turn brown and cause leaves to drop prematurely. This aphid does not feed in crowded colonies. HONEYDEW-PRODUCING APHIDS also suck juices from pecan leaves. They usually feed in crowded colonies, causing leaves to curl and turn brown.
Mite	When present	6 lb. wettable sulfur	Tiny pale green mites in webs may be found on the underside of the leaves, especially if the trees have been sprayed with DDT. Heavy infestations produce a scorched appearance of the leaves and cause leaf shedding.
Pecan weevil	Late summer	6 lb. 50% wettable DDT.	Pecan weevil adults emerge in late summer, usually following rains. In areas where the weevil is a pest, begin checking for weevils during the first week in August by spreading a canvas underneath trees and jarring the lower branches. When three or more weevils are found per tree, apply sp[illegible]

ROSETTE: Rosette is a nutritional disease which occurs when there is not enough available zinc in the soil to meet the requirements for pecan tree growth and nut production. Early stage rosette appears as yellowish mottling in the leaves. In severely infected trees, the leaflets are narrow and have reddish-brown areas between the veins. The internodes of the shoots are shortened, giving the tree a bunched or rosetted appearance. Spray the trees with 36% zinc sulfate at the rate of 2 lb. to 100 gal. of water. Make first application at the time of casebearer spray. The second and third applications should be made at 3 to 4-week intervals. ZINC SULFATE MAY BE ADDED TO INSECT AND DISEASE CONTROL SPRAY MIXTURES.

GRAPES

INSECTS AND DISEASES	WHEN TO SPRAY	INSECTICIDES AND FUNGICIDES Based on 100 gallons of spray	REMARKS
Black rot and other diseases.	When new shoots are 3" to 6" long.	8-8-100 Bordeaux-mixture or 2 lb. ferbam.	Black rot disease, common in wet seasons, affects the vines, leaves and fruit. The disease appears in the leaves as reddish brown, dead spots and in half-grown fruit as pale spots which turn brown, enlarge and soon involve the entire berry. Later, the infected berries become shriveled, black mummies which may fall to the ground or remain in the cluster. All infected vines should be pruned out, and the fallen mummied fruit and leaves, as well as pruning trimmings, in which the fungus may overwinter, should be raked together and burned.
Grape-berry moth, grape leafhopper, leaf-chewing insects, fungus diseases.	Just before blooms open.	3 lb. 50% wettable DDT for insect control. Add 8-8-100 Bordeaux-mixture or 2 lb. ferbam for disease control.	GRAPE-BERRY MOTH larvae feed on pulp and seed of the fruit, passing from one grape to another and causing berries to become discolored with purplish spots and shrivel. GRAPE LEAFHOPPERS suck juices from the leaves. Foliage becomes yellow-and brown-blotched. Insects are usually found feeding on the underside of leaves. Plants attacked are greatly weakened and yields are reduced. Grape-berry moth and grape leafhopper overwinter in rubbish or fallen leaves in the vineyard. It is a good practice to clean out and destroy these materials. LEAF-CHEWING INSECTS can be controlled with DDT as recommended for the grape-berry moth and leafhopper.
Same as above.	Just after berries set.	Same as above.	Same as above.
Black rot and other diseases.	About 2 weeks after berries set.	8-8-100 Bordeaux- mixture or 2 lb. ferbam.	

The recommendations in this circular are based upon results of experiments conducted by the Texas Agricultural Experiment Station, Texas A. & M. College System and other research agencies.

For additional information, contact your county agent or write the extension entomologists, College Station, Texas.

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